Enrolment No/Seat No.: _____

R.N.G.PATEL INSTITUTE OF TECHNOLOGY-RNGPIT

(An Autonomous Institute U/s UGC Act 1956)

IMSc-IT SEMESTER-II, SEMESTER END EXAMINATION – WINTER 2025

SUBJECT CODE: 1BS203 **DATE: 07-01-2026**

SUBJECT NAME: DATA STRUCTURE

TIME: 11:00 AM to 01:30 PM **TOTAL MARKS: 70**

Instructions

1. It is **compulsory** for students to write **Enrolment No. /Seat No.** on the question paper.
2. Write answers of **Section A** and **Section B** in **separate answer books**.
3. Attempt all questions from both **Section A** and **Section B**.
4. Each section carries **35 marks**, with a total of **70 marks** for the examination.
5. The figures to the right of each question indicate full marks, make suitable assumptions with justification.
6. BL - Bloom's Taxonomy Levels (R-Remember, U-Understanding, A –Application, N –Analyze, E – Evaluate, C -Create), CO - Course Outcomes.

SECTION A

		Marks	BL	CO
Q.1	**Multiple-Choice Questions**	**[05]**		
	(a) Which linked list allows traversal in both directions?	**1**	**U**	**3**
	(i) Singly Linked List **(ii)** Circular Linked List			
	(iii) Doubly Linked List **(iv)** Circular Singly Linked List			
	(b) Which of the following is a linear data structure?	**1**	**R**	**3**
	(i) Tree **(ii)** Graph			
	(iii) Linked List **(iv)** Heap			
	(c) Which traversal gives sorted order in a Binary Search Tree?	**1**	**R**	**4**
	(i) Preorder **(ii)** Postorder			
	(iii) Inorder **(iv)** Level order			
	(d) A tree data structure has:	**1**	**U**	**4**
	(i) Cycles **(ii)** No root node			
	(iii) Hierarchical structure **(iv)** Linear structure			

(e) Which sorting algorithm uses the divide and conquer technique?	**1**	**R**	**5**

(i) Bubble Sort **(ii)** Insertion Sort

(iii) Selection Sort **(iv)** Quick Sort

Q.2 Attempt Any Two **[10]**

(a) Explain Singly Linked List with a diagram and example.	**5**	**U**	**3**
(b) What is a Linked List? Explain doubly linked lists.	**5**	**R**	**3**
(c) Short note on implementation of linked list.	**5**	**R**	**3**

Q.3 Attempt Any Two **[10]**

(a) Define a Tree. List its basic terminologies	**5**	**R**	**4**
(b) Explain applications of trees in file systems and database indexing.	**5**	**U**	**4**
(c) Construct a Binary Search Tree for the following elements: 50, 30, 70, 20, 40, 60, 80 and write its Inorder traversal.	**5**	**A**	**4**

Q.4 Attempt Any Two **[10]**

(a) Explain Linear Search and Binary Search with examples.	**5**	**R**	**5**
(b) Sort the following elements using Selection Sort:64, 25, 12, 22,11	**5**	**A**	**5**
(c) Illustrate Bubble Sort and Insertion Sort with step-by-step procedure.	**5**	**R**	**5**

SECTION B

		Marks	BL	CO
Q.5	**Multiple-Choice Questions**	**[05]**		
	(a) Which of the following is a non-linear data structure?	**1**	**R**	**1**
	(i) Stack **(ii)** Linked List **(iii)** Queue **(iv)** Tree			
	(b) An algorithm is	**1**	**U**	**1**
	(i)A flowchart **(ii)**A programming language **(iii)**A set of well-defined steps **(iv)**A data structure			
	(c) Stack overflow occurs when	**1**	**R**	**2**
	(i) Stack is partially filled **(ii)**Pop operation is performed **(iii)**Stack is empty **(iv)**Stack is full and push is attempted			
	(d) Queue underflow occurs when	**1**	**U**	**2**
	(i) Enqueue is attempted **(ii)**Queue is empty and dequeue is attempted **(iii)**Queue is full **(iv)**Queue has many elements			
	(e) Which queue allows insertion and deletion at both ends?	**1**	**U**	**2**
	(i) Deque **(ii)** Circular **(iii)**Simple **(iv)** Priority			
Q.6	**Attempt Any Two**	**[10]**		
	(a) Explain pointer variables in detail.	**5**	**R**	**1**
	(b) Explain linear and non-linear data structures.	**5**	**U**	**1**
	(c) Explain the importance of algorithms in problem solving.	**5**	**U**	**1**
Q.7	**Attempt Any Two**	**[10]**		
	(a) Explain stack in detail.	**5**	**R**	**2**
	(b) Explain evaluation of postfix expression using stack with example.	**5**	**U**	**2**
	(c) Convert following expression a+((b-(c+d))/(e-f)) in to postfix form.	**5**	**A**	**2**

Q.8	**Attempt Any Two**	**[10]**		
	(a) Explain Circular Queue in detail.	**5**	**R**	**2**
	(b) Explain Deque in detail.	**5**	**R**	**2**
	(c) Write a program to implement priority queue using array.	**5**	**A**	**2**

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